

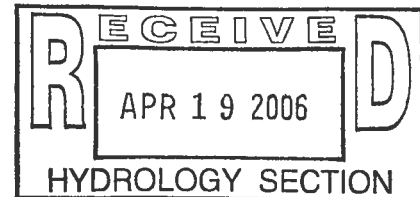
DRAINAGE STUDY

COTTONWOOD APARTMENTS

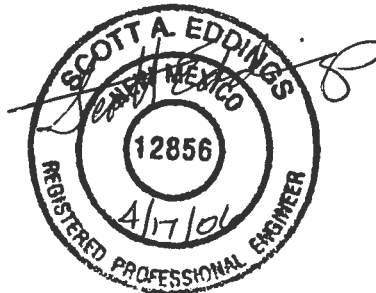
**3601 SEVEN BAR LOOP RD. NW
COTTONWOOD TRACTS A-C**

For

**GSL PROPERTIES
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PORTLAND, OR 97205
Phone: (503) 944-6503**



April 17, 2005



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DRAINAGE STUDY FOR COTTONWOOD APARTMENTS

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DRAINAGE STUDY FOR COTTONWOOD APARTMENTS

PURPOSE

This drainage report addresses the storm water runoff existing and proposed for development of the subject property. This report will also demonstrate the proposed development of this project complies with the COA approved Drainage Plan for the site and meets the City of Albuquerque requirements for controlling developed runoff from the site.

PROJECT LOCATION AND DESCRIPTION

The project site is located west of Coors Blvd. north of Seven Bar Loop, east of Cottonwood Drive, and south of Airport Ave. See page A-1. The site is currently undeveloped with the exception of an existing old paved parking lot located along the easterly side of the property. Seven Bar Loop, Cottonwood Drive and Airport Ave. are all currently improved streets with utilities. A storm drain exists in Airport Drive which has been designed to accept controlled runoff from the site.

ZONING AND PLATTING STATUS

The zoning for the subject property is SU-1 for C-2 and IP uses. The entire, three tract, site contains approximately 15.67 acres. The project is located within Tract H, Seven Bar Ranch Subdivision.

FLOOD HAZARD ZONES

Per FEMA's Flood Insurance Rate Map (FIRM) 35001C0109F, dated November 19, 2003 (Page A-2), the site is not located within a 100-year Flood Hazard Zone.

JURISDICTIONS FOR PUBLIC REVIEW AGENCIES

Local

This project is located entirely within the City of Albuquerque Municipal Limits and is therefore within their jurisdiction and must comply with the City's development and drainage requirements.

Regional

This project is located within the jurisdiction of the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) and is therefore subject to their approval.

METHODOLOGY

This drainage study is based upon procedures outlined in "Section 22.2, Hydrology of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993 – basins < 40 acres".

PRECIPITATION

The site is located within Zone 1 of the design manual. See attached calculations.

LAND TREATMENTS

The ten basins are well defined for the determination of percent impervious/pervious areas. For basin A, B, E and F the Land Treatment Type B is 25 % and Land Treatment Type D is 75 %. For basin C, D, G, H and I the Land Treatment Type B is 26% and Land Treatment Type D is 74%. For basins, ponds, F and H the Land Treatment Type B is 90% and Land Treatment Type C is 10%. It was assumed that Land Treatment Type B for the Basin J is 25% and Land Treatment Type D is 75%. See the attached calculations.

PRE-DEVELOPED CONDITIONS

This project site is currently undeveloped with the exception of an old parking area located along the easterly side of the property. The property sloped from the southwest to the northeast (Airport Ave.). The only off-site runoff which enters the site is from private property to the west. The undeveloped flows from this property will be allowed to continue to cross the site until it is developed and then must comply with the COA approved Drainage Plan. A master Drainage Report was prepared and approved for this property along with the surrounding property. This report outlines allowable runoff from this site as 1.17 cfs/acre. This report was prepared for the existing Lowe's store by Wilson & Company engineer, dated July 2001. An existing storm drainage system exists in Airport Ave. with inlets and drainage pipe stubouts located along the subject site.

ULTIMATE DEVELOPED CONDITIONS

The drainage design divides the project into ten basins of property to comply with the proposed platting for the site. Each tract of property will drain its storm water to detention ponds located at the downstream end of each tract of land.

CONCLUSION

The proposed development of the subject property complies with the approved Wilson & Company Master Drainage Plan for the site.

COTTONWOOD APARTMENTS

100-Year 24-Hour Duration Storm-Developed

AHYMO Summary File

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AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -
INPUT FILE = G:\Proj\170527-1\DRN_ST-1\AHYMO\COTTON-1.DAT

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) = 04/17/2006
USER NO. = AHYMO-I-9702a01000150-SH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1	NOTATION
START											TIME= .00
LOCATION											
*S											
*S	COTTONWOOD APARTMENTS										
*S											
*S	FN:COTTONWOOD.DAT - HYMO PER JAN 1997 DPM REVISIONS										
*S											
*S											
*S											
RAINFALL TYPE= 2											RAIN24= 2.800
*S*****											
*S BULK FOR SEDIMENT - DEVELOPED											
SEDIMENT BULK											PK BF = 1.05
*S-----											
*S COMPUTE DEVELOPED BASIN A											
COMPUTE NM HYD BASIN.A		-	1	.00552	13.49	.631	2.14224	1.500	3.817	PER IMP=	75.00
*S-----											
*S COMPUTE DEVELOPED BASIN B											
COMPUTE NM HYD BASIN.B		-	2	.00238	5.82	.272	2.14224	1.500	3.823	PER IMP=	75.00
*S-----											
*S COMPUTE DEVELOPED BASIN C											
COMPUTE NM HYD BASIN.C		-	3	.00213	5.17	.241	2.12037	1.500	3.792	PER IMP=	74.00
*S-----											
*S COMPUTE DEVELOPED BASIN D											
COMPUTE NM HYD BASIN.D		-	4	.00844	20.44	.954	2.12037	1.500	3.785	PER IMP=	74.00
*S-----											
*S COMPUTE DEVELOPED BASIN E											
COMPUTE NM HYD BASIN.E		-	5	.00061	1.49	.069	2.12037	1.500	3.820	PER IMP=	74.00
*S-----											
*S COMPUTE DEVELOPED BASIN F (POND)											
COMPUTE NM HYD BASIN.F		-	6	.00089	1.05	.029	.61413	1.500	1.837	PER IMP=	.00
*S-----											
*S COMPUTE DEVELOPED BASIN G											
COMPUTE NM HYD BASIN.G		-	7	.00013	.33	.015	2.12037	1.500	3.926	PER IMP=	74.00
*S-----											
*S COMPUTE DEVELOPED BASIN H (POND)											
COMPUTE NM HYD BASIN.H		-	8	.00086	1.01	.028	.61413	1.500	1.839	PER IMP=	.00
*S-----											
*S COMPUTE DEVELOPED BASIN I											
COMPUTE NM HYD BASIN.I		-	9	.00041	1.01	.046	2.12037	1.500	3.835	PER IMP=	74.00
*S-----											
*S COMPUTE DEVELOPED BASIN J											
COMPUTE NM HYD BASIN.J		-	10	.00305	7.46	.348	2.14224	1.500	3.821	PER IMP=	75.00
*S-----											
*S COMPUTE DEVELOPED BASIN OFFSITE											
COMPUTE NM HYD BASIN.OFFSIT		-	11	.00617	5.79	.165	.50217	1.500	1.467	PER IMP=	.00
*S-----											
*S ADD BASIN.J TO BASIN.D											
ADD HYD BASIN.JD		4&10	12	.01149	27.90	1.303	2.12613	1.500	3.794		
*S-----											
*S ADD BASIN.JD TO BASIN.I											
ADD HYD BASIN.JDI		9&12	13	.01190	28.91	1.349	2.12591	1.500	3.796		
*S-----											
*S ADD BASIN.JDI TO BASIN.C											
ADD HYD BASIN.JDIC		3&13	14	.01403	34.08	1.590	2.12504	1.500	3.795		
*S-----											
*S ADD BASIN.JDIC TO BASIN.H											
ADD HYD POND.A		8&14	15	.01489	35.09	1.618	2.03777	1.500	3.682		
*S-----											
*S ROUTE THROUGH ONSITE POND A											
*S NEW RATING CURVE											
ROUTE RESERVOIR		POND.A.OUT	15	16	.01489	7.98	1.618	2.03777	2.000	.838 AC-FT=	.703
*S-----											
*S ADD BASIN.A TO BASIN.B											
ADD HYD BASIN.AB		1&2	17	.00790	19.31	.903	2.14216	1.500	3.819		
*S-----											
*S ADD BASIN.AB TO BASIN.E											
ADD HYD BASIN.ABE		5&17	18	.00851	20.80	.972	2.14057	1.500	3.819		
*S-----											
*S ADD BASIN.ABE TO BASIN.F											

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 2	NOTATION
ADD HYD	POND.B	6&18	19	.00940	21.85	1.001	1.99603	1.500	3.632		
*S-----											
*S ROUTE THROUGH ONSITE POND B											
*S NEW RATING CURVE											
ROUTE RESERVOIR		POND.B.OUT	19	20	.00940	7.08	1.001	1.99603	1.800	1.176 AC-FT=	.341
*S-----											
FINISH											

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Detention Pond Rating Curve

POND A

Side Slope (4:1)

Depth (ft)	Area		Volume (ac-ft)	Cum Volume (ac-ft)
	(sq ft)	(ac)		
0	5052	0.116	0	0
1	7845	0.116	0.116	0.116
2	10857	0.180	0.148	0.264
3	13995	0.249	0.215	0.479
4	17251	0.321	0.285	0.764

Detention Pond Rating Curve

POND B

Side Slope (4:1)

Depth (ft)	Area		Volume (ac-ft)	Cum Volume (ac-ft)
	(sq ft)	(ac)		
0	2897	0.066	0	0
1	5935	0.066	0.066	0.066
2	9097	0.136	0.101	0.168
3	12371	0.209	0.173	0.340
4	15755	0.284	0.246	0.587

Cottonwood Apartments Detention Pond Standpipe - POND 'A'

STANDPIPE DIA (in)	HOLES/ ROW	WATER DEPTH	HEAD					Q (cfs)					Q TOTAL (cfs)
			ROW 1	ROW 2	ROW 3	WEIR	ORIFICE	ROW 1	ROW 2	ROW 3	WEIR	ORIFICE	
48	6.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPACE ABOVE TOP ORIFICE TO WEIR (in)	ROW 1 SIZE 4.00	0.5	0.33	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	1.46
		1.0	0.83	0.50	0.33	0.00	0.00	2.30	1.78	0.00	0.00	0.00	4.08
	ROW 2 SIZE 4.00	1.5	1.33	1.00	0.83	0.00	0.00	2.91	2.52	0.00	0.00	0.00	5.43
		2.0	1.83	1.50	1.33	0.00	0.00	3.41	3.09	0.00	0.00	0.00	6.50
PIPE HEIGHT (in) (ABOVE GROUND)	ROW 3 SIZE 4.00	2.5	2.33	2.00	1.83	0.00	0.00	3.85	3.57	0.00	0.00	0.00	7.42
		3.0	2.83	2.50	2.33	0.00	0.00	4.24	3.99	0.00	0.00	0.00	8.23
42	HOLE SPACE	3.50	3.33	3.00	2.83	0.50	0.50	4.60	4.37	0.00	13.33	42.78	22.30
PIPE HEIGHT (ft) (ABOVE GROUND)	# OF ROWS 2.00												

Does

Cottonwood Apartments Detention Pond Standpipe - POND 'B'

[illegible]